Sylvester/Gilson Road site
Nashua

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The Sylvester Superfund site, also called the Gilson Road site, is a seven-acre sand and gravel pit that was used for disposal of hazardous liquids and solid waste from the late 1960s through 1979. Over 900,000 gallons of fluids containing a variety of toxic organic and inorganic compounds were disposed at the site, contaminating the soils and groundwater. The contaminated groundwater plume migrated to the northwest and threatened drinking water wells of nearby homes. The leading edge of the contaminated groundwater plume flowed into and under Lyle Reed Brook, and was carried downstream to the Nashua River, and then to the Merrimack River. This posed a potential threat to public water supplies.

Several emergency actions were undertaken after discovery to ensure protection of public health and the environment: 1) a security fence was placed around the entire site by the city of Nashua in May 1980; 2) over 1,300 drums were removed and sent to an approved hazardous waste facility for treatment and disposal; 3) after the signing of the Record of Decision (ROD) in July 1982, the United States Environmental Protection Agency (EPA) installed an emergency groundwater interception and recirculation system to impede the migration of contaminated groundwater to Lyle Reed Brook; 4) in late 1982, a bentonite slurry wall was constructed around the site to inhibit migration of contaminated groundwater from the site, and an impervious cap was placed over the site to prevent the infiltration and contamination of rainwater; and 5) the city of Nashua extended municipal water to the surrounding area in 1983.

In the fall of 1983, EPA issued a supplemental ROD that authorized construction of a $5.4 million groundwater treatment facility and established cleanup goals for the site. Construction of the facility began in the spring of 1984, and it was completed in 1986. Between 1986 and 1996, the facility treated groundwater at a rate of approximately one-half million gallons per day. Inorganic constituents were initially precipitated from the water and dewatered in a filter press before placement in an on-site lined landfill. Volatile organic compounds (VOC) were then stripped from the groundwater and destroyed by incineration. The processed water was then pumped back into groundwater recharge wells located within the bentonite slurry wall containment area. More than one billion gallons of groundwater was pumped through the treatment facility during its operational life, and more than 430,000 pounds of contaminants were removed.

In 1995, EPA and New Hampshire Department of Environmental Services (NHDES) determined that active treatment goals had been achieved, and in January 1996 groundwater treatment ceased. The facility was maintained in an operational condition for five years following shut-down. Discussions between EPA and NHDES officials led to

the conclusion that the treatment plant was obsolete, and that less expensive alternative remedial technologies exist if contaminant levels ever rebound and additional treatment were necessary. Pumping and recharge wells were left in place, but the plant was decommissioned, and treatment equipment was dismantled and removed by August 2001. The second of the two on-site landfill cells was closed during the summer of 2005.

The NHDES has continued to monitor groundwater and surface waters both within the containment area and offsite. The data show a continued downward concentration trend of contaminant concentrations associated with the original plume.

It has been found that sediment in Lyle Reed Brook contains elevated levels of arsenic, though arsenic is not a contaminant historically associated with the contaminant plume. The arsenic has likely been mobilized from the natural soils of the area to a greater extent than would otherwise occur under ambient conditions due to the chemical dynamics of the site. However, sampling performed since 2004 indicates that Lyle Reed Brook is in compliance with current New Hampshire surface water quality regulations. Further, an evaluation by NHDES of sediment quality found that arsenic-containing sediments do not pose a significant risk to benthic organisms or to human health (*Evaluation of Sediment Quality to Support an Ecological Risk Assessment at the Gilson Road Superfund site, NHDES, Concord, NH, July 2004*).

Beginning in 2009, NHDES worked with the City of Nashua to expand and combine the Groundwater Management Zones for the Gilson Road site and Four Hills Landfill through a municipal ordinance that was finalized in October 2013. In addition, in 2012, NHDES contracted with an environmental consultant to evaluate the potential for contaminant vapors to migrate to indoor air in nearby residential neighborhoods; the subsequent report concluded that there was no risk of vapor intrusion. Finally, NHDES and EPA worked with an EPA research group in Ada Oklahoma to evaluate the current and long-term functionality of the cap and slurry wall: the report was finalized in May 2014 and concluded that the slurry wall and cap continue to function as intended; minimizing groundwater and surface water influx to the encapsulated area.

EPA's fifth five-year review was signed on September 4, 2014, and found the remedy protective of human health and the environment in the short-term. To be protective in the long-term, groundwater, surface water, and sediment monitoring was expanded in 2015 to further characterize the transport and fate of arsenic from the site, specifically with concern for Lyle Reed Brook. This additional characterization resulted in several conclusions, including the following:

- the extents of the VOC, 1,4-dioxane, and arsenic plumes in groundwater are well-defined and found to be similar to the general patterns observed in prior years except that the leading edge of the plume has contracted since 1996 and that a shift

in the core of the VOC plume has occurred but remains within the overall limits of the VOC plume;
- the VOC plume is interpreted to extend along Lyle Reed Brook downstream approximately as far as the Tumblebrook Drive crossing, however, concentrations of VOCs are decreasing overall;
- anaerobic groundwater conditions exist within the VOC contaminant plume and possibly provide a mechanism for mobilization of naturally present arsenic within and immediately downgradient of the containment area;
- the arsenic plume is interpreted to discharge to Lyle Reed Brook, from a point upstream near the western-most edge of the containment wall, extending downstream to the approximate location of the Tumblebrook Drive crossing;
- concentrations of arsenic in Lyle Reed Brook have remained at low concentrations, below the current New Hampshire Surface Water Quality Criteria, since monitoring began back in 1988;
- historical results for arsenic in sediment have consistently exceeded ecological screening criteria but past risk evaluations have concluded that the arsenic in surface water and sediment in Lyle Reed Brook do not pose a significant risk to human health;
- arsenic in the sediment has the potential to adversely affect benthic organisms depending on the bioavailability of the arsenic, which has not been indicated by past ecological studies; and
- based on existing sediment data, sediment discharge of arsenic to Lyle Reed Brook does not appear to significantly increase downstream sediment concentrations.

Site maintenance activities in the past few years have included tree removal from the capped containment area. In 2016 and 2018, sampling returned to a reduced set of wells to maintain monitoring of natural attenuation conditions and plume extent, and in 2016 included pore water sampling at select surface water/sediment locations to further evaluate the arsenic release mechanisms relative to ecological risk concerns. Sampling in 2018 included analysis for the emerging contaminant known as per- and polyfluorinated alkyl substances (PFAS), which revealed that the compounds are present and further delineation is warranted.